"If war were declared to-morrow, what would we do for aircraft?"

AVIATION

MARCH 19, 1923 Issued Weekly PRICE 10 CENTS

Flying Time is near: Southern New Jersey on a Sunny Day

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VOLUME XIV

Number 12

SPECIAL FEATURES

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CONTEST FOR AIR POWER IN THE PACIFIC

NON-DIMENSIONAL COEFFICIENTS FOR AIRSHIPS

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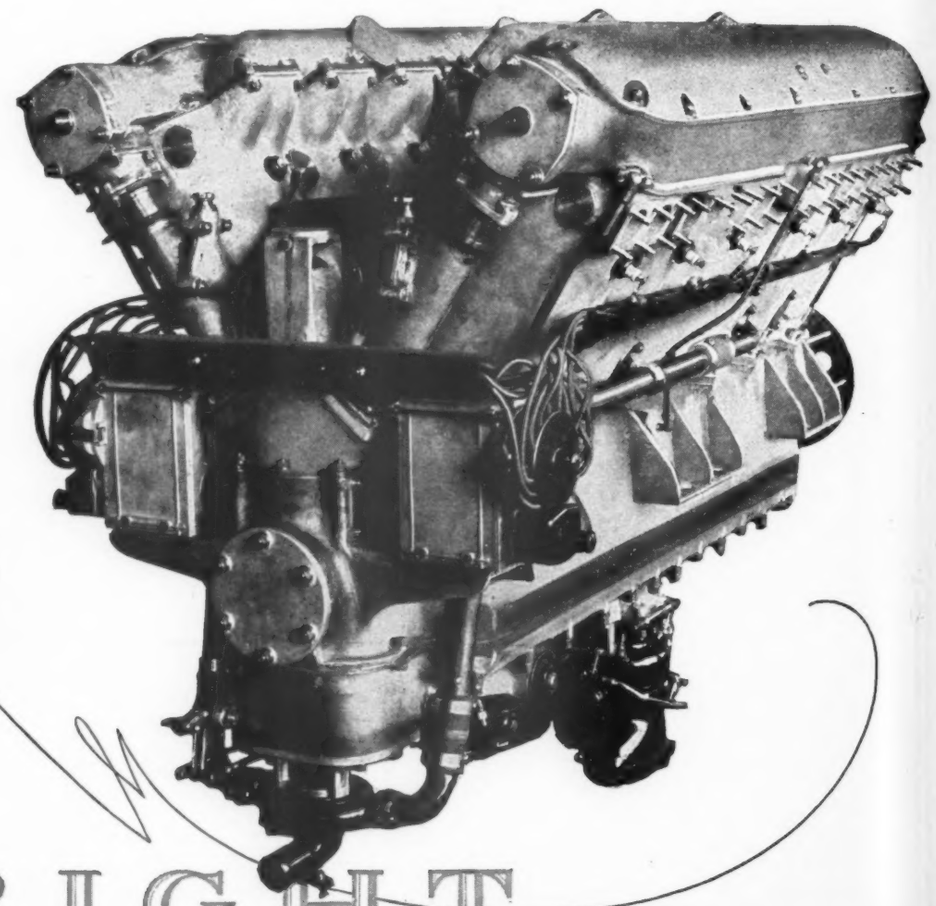

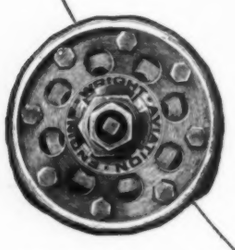

"The Identification of Incomparable Service"

WRIGHT

MARCH 19, 1923

AVIATION

VOL. XIV. NO. 12

Member of the Audit Bureau of Circulations

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Vol. XIV MARCH 19, 1923 No. 12

The Growing Air Forces

THAT Premier Mussolini should deem it necessary at this time to give Italy a separate air force is significant. It indicates that European states are recognizing the growing importance of air power for national defense. Premier Mussolini places the respective air strength of various countries as follows: France, United States, Great Britain, Russia, Belgium, and Jugo-Slavia, not including Italy.

His comments on the aeronautical situation in Europe are of considerable interest. He said among others:

"After making an accurate examination of the great importance that Aeronautics is assuming as a military and civil factor in all the nations of the world, after having assembled a council of admirals and generals to consider in detail this important problem, after having obtained the views and programs of the Italian Aeronautical Association and of various Italian technical, professional, and sportive aeronautical associations, I have concluded that Italian Aeronautics, with the exception of that of the Navy, is in a state of insufficiency and inefficiency. In order to build up an aeronautical force in Italy, I have combined all aviation activities into a Department of Aviation.

"France's Army Aviation consists of fourteen regiments with a total of 134 squadrons, with 1340 armed machines of the first line and 2500 machines held in reserve. In addition France has completely organized an aeronautical industry made up of fifty important factories immediately available for the construction of airplanes, of engines, of carburetors, of instruments, and of aeronautical electrical and signalling equipment."

Continuing he stated that "the efforts being made by the nations for forming an Air Force are the most eloquent proof of the fact that a powerful and efficient air arm is a necessity. I therefore intend to make a rapid reorganization of our air activities in order to bring them up to the necessary strength and efficiency in the shortest possible time.

"At the present time the Italian Army Air Service has 4019 efficient engines, 250 efficient airplanes, fourteen aviation fields completed and sixteen being completed. All this material is to be used. My program calls for 720 new machines and the formation of the groups into wings. For this program a sum of 280,000,000 Lire for the fiscal year 1923-1924 is necessary. 42,000,000 Lire of this sum will be made immediately available, which, with the 78,000,000 Lire still available for the current fiscal year, I propose to employ for the execution of my program at once. The aeronautical constructing industry must be organized and put on a firm footing at the same time."

More light on the European air situation was shed by Sir Samuel Hoare, British Secretary of State for Air, when, introducing his estimates in the House of Commons, he stated that Great Britain had been left far behind France in the development of air power.

At the end of the war, he said, Britain had 3,300 service airplanes and France 3,600. The position now was that Britain had 371 first-line planes and France 1,260. Last year 200 semi-military machines were built in Great Britain, as against 3,300 in France.

While two-thirds of the British machines were overseas, he said, all the French machines were in France. In 1925 France would have 2,187 machines and Britain would have only 575.

A one-power standard air force (equal strength with France) would mean an increase in the present estimates of over £5,000,000, Sir Samuel said, and an eventual increase, in order to keep pace with the programs of other powers, of £17,000,000. The one-power standard would cost £35,000,000 a year net. The estimates for 1923-1924 are £18,605,000.

It is fortunate that Assistant Secretary of War Wainwright recently made such a strong appeal for our own air development. His estimate of $15,000,000 a year for new equipment for the Army Air Service is fully in line with foreign events.

The significant and disturbing thing about the aerial arm is that it can be organized with a comparatively small initial outlay, and kept in a state of efficiency with little expense, evaluating money in terms of armament expenditures. Leon Trotzky, the Russian war commissar, made a correct estimate of the situation when, watching the evolutions of Red air squadrons, he said: "In the air all start alike." In the matter of air power the only superiority one country can have over another is one of technical excellence—even that is being growingly equalized—and of *manufacturing resources*. The latter is really the outstanding factor of the situation, for the theory that some nations produce "born fliers"while others don't has long been exploded. The brief news item about Siam, printed in this issue, is illuminating in this respect.

The real reason why "in the air all start alike" is the quick obsolescence of aircraft. This renders almost useless the building up of huge reserve stocks, unless a nation maintains a powerful air force which is using them up fast enough to have the reserve *matériel* constantly renewed, as is the case of France. Barring a strong standing air force, reliance on a peace-time skeleton organization which can quickly be expanded in time of war is a safe policy only with a healthy private aircraft industry. This is the main spring which actuates the governments of Europe in subsidizing civil air transport companies.

American air strength has been steadily slipping into the background ever since the demobilization. In the meantime new air powers are rising: Russia, Poland, Czechoslovakia, the Netherlands—not to speak of Japan. Their rise cannot but be proportional with our eclipse, for we are remaining stationary. Will Congress see the writing on the wall?

"If war were declared to-morrow, what would we do for aircraft?"

Non-Dimensional Coefficients for Comparison of Airship Characteristics

By P. Jaray

Engineering Staff, Zeppelin Airship Construction Co.

When describing airships, their characteristics are usually expressed in terms of the ship's size and engine power, and of lift and speed. These figures indicate what performance each particular ship is able to give, and what amount of structural weight and engine power have been employed for producing that performance, the term performance denoting the greatest absolute speed at which an airship can proceed in the horizontal plane and the greatest amount of useful load it can carry. But even assuming that the performance data are all based on standard atmospheric conditions, they still do not provide a ready means for direct comparison of different types and makes, as they are not related to common basis. If used for this purpose, they may therefore prove misleading, especially to those who are not thoroughly acquainted with this highly specialized branch of engineering.

In order to make the above named characteristics fit for comparison, each absolute quantity must be related to some other known quantity of equal dimension, so that non-dimensional quantities may be obtained. The conditions for the balance of forces on the mechanically propelled airship suggest themselves as a suitable form of relation.

As the propelling force is counterbalanced by the resistance of the hull and its accessories, the speed at which an airship of a given size can be driven by the horsepower installed depends upon how efficiently the power available at the crankshaft is converted into useful propeller thrust, and also upon the resistance of the airship. The latter quality is affected by the external form of the airship only, and may conveniently be expressed by the drag coefficient, which, like the power conversion efficiency, is non-dimensional.

If put into mathematical form, the forces acting on an airship in motion may be written as:—

Propeller Thrust in kg.: $P = 75 \frac{\eta . N}{v}$

Resistance " " $W = \xi \gamma / g \, J^{2/3} \, v^2$

where v is the velocity of the airship in meters per second;
N the total horsepower available at the crankshaft;
η the efficiency of the propeller and the transmission gear;
J the volume of the airship in cubic meters;
ξ the drag coefficient of the hull with all accessories.

As the forces P and W must be in equilibrium, we may deduce from the above equations the expression:—

COMPARISON OF THE WORLD'S AIRSHIPS

Type	Nationality	Year	Capacity (cubic meters)	Diameter (meters)	Length (meters)	Disposable Lift (kilos)	Fixed weight (kilos)	Total rated hp.	Max speed (m./sec.)	Coefficients I η/ξ	II θ	III λ
Non-Rigid and Semi-Rigid Airships												
Caussin T2	France	1916	9120	14,0	81,3	4880	5720	450	25,8	28,0	0,85	24
PL27	Germany	1917	31300	19,6	158	18000	18400	960	25	27,0	0,98	26
NS	England	1916-1918	10200	17,8	80	4650	7200	520	25,7	25,6	0,65	17
Goodyear Pony Blimp	America	1919	990	8,5	29	430	720	40	18	24,2	0,60	15
T34 "Roma"	Italy	1920	34000	25	125	16000	23500	3000*	33,3*	21,5*	0,68	15
*Probably high												
Rigid Airships												
LZ62-LZ111	Germany	1916-1917	56000	23,9	196,5	40000	25100	1200	30,2	56,0	1,59	89
LZ102 LZ104	Germany	1917	68500	23,9	226,5	52100	27500	1200	28,6	54,4	1,90	103
SL22	Germany	1918	56000	23,0	198,3	37500	27600	1200	28,1	45,2	1,36	61
LZ112 LZ113	Germany	1918	62200	23,9	211,5	44500	27800	2090	36,4	62,2	1,60	100
R33 R34	England	1919	55500	23,9	195	27600	36900	1250	26,8	37,3	0,75	28
LZ120 "Bodensee"	Germany	1919	20000	18,7	120,8	10000	13200	960	36,8	63,7	0,76	48
LZ121 "Nordstern"	Germany	1919	22550	18,7	130,8	11500	14700	960	35,4	61,4	0,78	48
R80	England	1920	34000	21,3	162	17500	22000	920	26,8	36,6	0,80	29
R36 and R37	England	1919-1920	59500	24	205	30700	38400	1570	29,1	40,0	0,80	32

Note. The standard conditions the above values of disposable lift are referred to are: specific gravity of the gas = 0,1; barometric pressure = 760 mm mercury; temperature = 0°C

The above data are mostly average values calculated from those published, the latest having been naturally preferred.

"If war were declared to-morrow, what would we do for aircraft?"

$$\eta/\xi = \gamma/g \cdot \frac{J^{\frac{2}{3}} \cdot v^3}{-75.N}$$

which represents the *propulsion efficiency*. This shows the degree of perfection reached by the design of propellers, including their transmission gear—taking the present type of airship engine as a preliminary standard—on the one hand, and on the other by the hull shapes, and serves as a common measurement from the aerodynamic point of view for all types and sizes of airships.

It can be used to illustrate the comparative degree of efficiency to which the structural design and the disposition of materials has been developed in different types and makes of airships of similar size and speed and of similar service requirements. When comparing on this basis airships of different size and speed and equipped for different kinds of service, due consideration should be taken of the fact that in airships of similar design the fixed weight usually consumes a smaller portion of the total lift as size increases and speed decreases. It should also be noted that the weight allowed for accommodation of the pay load depends very much upon the kind of load to be carried and, in the case of passenger carrying airships, upon the degree of comfort provided for.

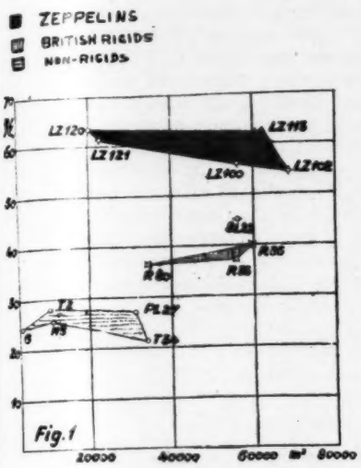


Fig. 1. Propulsion Efficiency

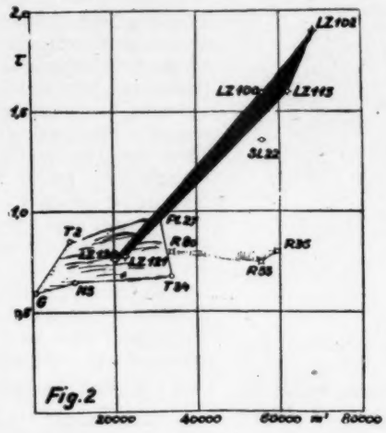


Fig. 2. Lifting Efficiency

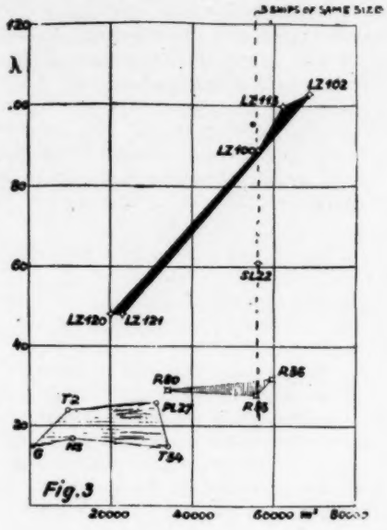


Fig. 3. General Efficiency

The disposable lift, that is, the proportion of the total lift available for fuel and oil, ballast, stores, crew and pay load, is determined by the magnitude of the fixed weights (structure, machinery, equipment, etc.) and by the normal lifting power of the gas which gives the airship its buoyancy.

If A is the total lift of the airship for some specified set of atmospheric conditions, G the total fixed weight and Q the "useful load" (or disposable lift), the equation of equilibrium is: —

$$A = G + Q$$

The efficiency of structural design may be expressed as the ratio of disposable lift to fixed weight, denoted

$$\theta = Q/G = \frac{A}{G} - 1$$

which can be called the *lift efficiency*.

By a somewhat arbitrarily chosen combination, that is, by forming the product of the values representing the efficiency of propulsion and the lifting efficiency, a third expression

$$\lambda = \eta/\xi \; \theta$$

can be obtained, which may be called the "general efficiency." This may be used to indicate the qualities of an airship from both the aerodynamic and structural points of view.

The accompanying Figs. 1 to 3 show the values of η/ξ, θ and λ plotted on a base of airship volume for some of the latest and most remarkable American, British, French, Italian and German rigid and non-rigid airships. The data from which these values have been calculated were carefully selected from various publications and are tabulated in the accompanying table.

Discussion by R. H. Upson

Mr. Jaray's paper starts out with a statement of the value of non-dimensional characteristics. There is no arguing against that. It then develops coefficients for comparison (a) Propulsive efficiency. (b) Lift efficiency, (c) General efficiency.

The proposed coefficient of "'propulsive efficiency" I think is the best of its kind. In its physical conception it is identical with the well known "Admiralty Coefficient" of naval architects, but differs from it in being truly non-dimensional, i.e. it makes no difference in its value what system of measurements is used. It also makes no difference what the atmospheric conditions are or at what altitude the ship is flying, *providing* the figures for brake horsepower and air speed are simultaneous with the other conditions assumed. I am afraid that this condition is not fulfilled in the appended table, where the horsepowers appear to be purely nominal, and the speeds simply the maxima irrespective of altitude. In saying this I am of course well aware that the securing of accurate or even approximate data from various countries is difficult and often impossible. Engines are rated for varying altitudes and other conditions. Speeds may be measured or estimated in different ways that give them no common basis of comparison. It would be interesting to get the exact conditions on which the power and speed of the different Zeppelin ships were taken, also whether the volume is the gas volume or the total displacement volume.

The coefficient of "lifting efficiency" is not truly non-dimensional. It is simply the so called "useful load" divided by the fixed weight of the ship, and *must* be referred to certain atmospheric conditions, altitude, and gas quality. It is the same idea as the "useful load percentage" used in this country and elsewhere except that the latter is taken as a proportion of the gross lift instead of the fixed weight. Such a figure is sometimes rather misleading as it mixes up together such very dissimilar items of weight.

"If war were declared to-morrow, what would we do for aircraft?"

The weight of an airship is made up of no less than six main groups roughly as follows (for commercial use):—

A. Structure and Operation:

1. Gas weight.
2. Air (incl. fixed air and any required for maneuvering).
3. Ballast.
4. Structure proper, excl. of power plant and weights dependent on power plant; (in other words the weight which would be necessary for vanishingly small power).
5. Operating crew for short distance (excl. of engineers, wireless operator, and stewards).

B. All Which Must be Added to the Above to Complete a Flight over a Given Distance.

C. Fixed Power Weights:

1. Engines and all accessories.
2. Just enough fuel, oil and water to get started.
3. All structural weight which is dependent on power.
4. Engineers (for short distance).

D. Variable Power Weights:

1. Fuel, oil and water, including tanks (over and above item C2).
2. Extra engineers (with supplies and equipment) required for a flight of given distance.

E. True Useful Load:

1. Wireless apparatus and operator.
2. Passengers, freight, etc.
3. All attendents, accommodations and extra weights due to 1 and 2 above (for short distance).

F. Provisions, Supplies and Extra Items Which Must Be Added to Group E to Complete a Flight of Given Distance.

For a commercial airship, what we are interested in from a weight standpoint is to get *all* the above as low as possible except item E2. There is no short cut method of figuring it properly, but a preliminary comparison of structural efficiency alone may be obtained from the following formula, which I have used successfully for several years (same notation as present paper, in meters and kilograms):

$$\psi = 1 - \frac{G - 3.6\ N}{\gamma\ v}$$

where ψ is the coefficient of *structural efficiency*. The term 3.6 N is simply an allowance for the power-plant group and dependent weights (based on average figures).

The proposed measure of "general efficiency" I think is too arbitrary to be of much practical use. For years ingenious designers and mathematicians have tried to work out various formulas for "overall efficiency", "figure of merit" etc. for automobiles, airplanes and airships. It is all very pretty but (with apologies to Goldberg) "it doesn't mean anything." It has no more meaning for an airship than for a steamship, unless with particular reference to its conditions of use. There are two fundamental faults in all such formulas that I know of. In the first place they seek to combine things that cannot be combined in any arbitrary way. For example, the formula here given makes the propulsive and lifting efficiency of equal importance, whereas this relation only holds for one very special line of conditions. In the second place, such a formula invariably penalizes or favors certain characteristics which have no relation to the "efficiency" of construction. This particular formula favors unduly the large, low powered airships.

My general conclusions are that:—

With proper attention to the initial data, the formula for propulsive efficiency is the best obtainable for the purpose.

The formula for lifting efficiency may be somewhat improved.

The formula for general efficiency is wrong in principle and impractical in application.

Mr. Jaray's Reply

The figures used in the table and the three diagrams for the ships not manufactured by the Zeppelin Works were taken from current aeronautical publications. Only such factors were used as appeared to be worthy of serious consideration, however, and wherever possible were furnished by the constructors themselves.

For the computation of the aerodynamic factors (admitted by Mr. Upson as being trustworthy for purposes of comparison) the values for engine power and speed were reduced to a uniform altitude of 400 meters, at least in the case of our own ships. For similar data on other ships those furnished by the constructors had to be taken as a basis. In the LZ ships the speed was measured by a Pitot tube placed 9 ft. under the bow of the leading gondola, the "bow currents" being corrected for after some experiments to determine their effects. The coefficient of resistance is not based upon the total of all bodies placed in the airstream, but upon the factor denoting the gas-volume.

As factor for the useful lift capacity of any given construction the often used ratio between useful load and total lift was not taken; rather we chose the ratio between useful load and unloaded weight, as being more accurate and better adapted to show small differences. The total lift was obtained for *all* types by multiplying the gas volume by the lift coefficient c = 1.162 kg. per cubic meter, taken at 760 mm. of mercury, 0° air and gas temperature, 0.6 relative air humidity and 0.1 specific weight of gas. How nearly the actual gas capacity corresponds to the published data is of course impossible to determine. For unloaded weight all known elements were taken into consideration, including weight of envelope with framework and gas cells, motor units, service load and useful load. Wherever all the necessary data were *not* furnished, the weight was calculated from the known total lift and useful load. To reduce all factors to a common basis the values for useful load were computed from the above mentioned total lift values and the unloaded weight.

As noted in Mr. Upson's paper, the value of θ can be used only under certain conditions depending upon the individual characteristics of the ship in question. For example, from the point of view of constructional efficiency it would be unfair to establish a comparison between the large and slow Z-ship LZ104 and the small, fast "Bodensee". For a ship of 68,500 cubic meters and speed of 103 km. per hour θ = 1.9, while a ship of similar size (62,200 cubic meters) but having a higher rate of speed (131 km. per hour) shows θ = 1.6, whereas a ship of much smaller dimensions but of nearly equal speed, say 20,000 cubic meters at 133 km. per hour cannot today be expected to give a value beyond θ = 0.76.

It would be unquestionably more correct to include the size of the power plant in the factor corresponding to the constructional efficiency, but the data obtainable on that point to date are not sufficient to visualize θ in terms of size, speed, or required power. A separate coefficient to express the power plant in terms of its weight and a constant yet to be determined by usage would not be able to take care of future improvements in such installations, or even of each individual case with any reasonable accuracy.

The present formula takes into consideration the particular gas used which is a valuable feature if it becomes necessary to compare ships filled with different gases for lift capacity. For example the LZ104, if filled with helium, would show a lift coefficient of 43.5 whereby θ = 1.58, which is obviously a poorer performance. But it is quite within the range of possibilities that in time the use of helium may lead to considerable saving in structural and service weight, whereby present disadvantages may be overcome.

A criterion of the constructional excellence and choice of materials can be obtained only with use of θ-values, without taking the gas into consideration and being based solely upon the lift coefficient per unit of gas-volume.

As to the actual technical value of comparative coefficients, opinions may differ. They are merely suggested as a handy

means by which the various factors can be expressed without taking all the various elements entering into the problem under separate consideration. Any generalization is wrong in principle and unnecessary for the expert. But if it is to be made for the benefit of the non-technical man it is justifiable to use a method which assigns the same importance to speed as to useful load, both being of about equal value from the commercial standpoint.

Mr. Upson's criticism is therefore fully justified if the three factors are conceived as being adaptable to any and all cases as a basis for comparison. As far as the aerodynamic factor is concerned this is indeed the case. But the "constructional factor" θ which depends upon such widely diverging elements as size, power, and operating conditions, cannot be considered except after a study of the particular case in hand. For this reason an attempt has been made to supply the necessary data in the text and the tables.

Air Board of Chicago

At the annual meeting of the Air Board of Chicago held in the Council Chamber of the City Hall, 2.30 p. m., Feb. 8, 1923, Col. Bion J. Arnold was re-elected president; R. W. Schroeder, 1st vice president; George B. Foster, 2nd vice president; Charles W. Folds, treasurer, and James S. Stephens, secretary. Accredited committees representing twenty-four of the affiliated member organizations forming the Air Board of Chicago were present.

Prof. John F. Hayford, a member of The National Advisory Committee for Aeronautics, addressed the meeting favoring the support and passage of the "Civil Aeronautics Act of 1923" H.R. 13715. E. A. Bean, U. S. Radio Inspector, Morrow Krum of the Chicago Tribune, and Terence Vincent, representing the Chicago Postmaster, discussed the advisability of this proposed legislation. As few of those present had read the Bill, the matter was referred to the Committee on Legislation for investigation and recommendation. All of those interested were advised to obtain a copy of this Bill prior to the next meeting.

Alderman Frank J. Link, Chairman of the Aviation Committee of the City Council, presented a letter from His Honor, the Mayor of Chicago, accompanied by correspondence from the National Aeronautic Association, U.S.A., requesting advice regarding suitable sites for gliding contests near Chicago. This was referred to the Technical Committee for investigation and report.

A proposal to use the building of the Illinois Trust and Savings Bank as a memorial to Aviators and as a Club House, at an estimated expense of $500,000, for its removal and re-erection in a suitable location, was submitted by Mr. McFarlan of the Aviation Post, American Legion. No action was taken, as many of those present believed that effort had better be directed to providing and equipping landing fields.

Terence Vincent, R. W. Schroeder and Walter Brock of the Illino's Model Aero Club, were appointed a committee to cooperate with the Park Boards in promoting model airplane contests.

Applications for membership in the Air Board of Chicago were received from The Executives Club of Chicago, The Aviation Post, American Legion, The Society of Industrial Engineers, Food Products Club and Adventurers Club of Chicago.

Schneider Trophy Race, Sept. 28

The Navy Department was informed by cable March 8 that the Jacques Schneider aviation marine trophy race will be held off Cowes, Isle of Wight, England, on Sept. 28. The entrants will have a contest for navigability on Sept. 27.

The National Aeronautic Association on behalf of the Bureau of Aeronautics of the Navy has entered three seaplanes in this international competition. Entries have also been made by the Aero Clubs of Great Britain, France and Belgium.

Notices to Aviators

Boston Airport

The new Boston Airport is located on land recently filled by the Commonwealth of Massachusetts between Jeffries Point, in East Boston, and Governors Island. It lies approximately one mile east of the State House dome.

The field for the present will consist of two runways in the form of a T 1,500 ft. long. Cross bar of T runs northeast-southwest, base northwest-southeast. The runways are covered with cinders for a width of 100 ft. and graded for 50 ft. on each side of that. Four hangars are being erected southwest of the runways.

Landings should be made on the runways as the remainder of the field is impractical for landing at present. The runways can be seen easily, as the cinders contrast sharply with the surrounding light-colored clay.

The field will be ready early in the spring of 1923.

Further information may be obtained from the Boston Chamber of Commerce or from the Air Officer, First Corps Area, Army Base, Boston.

(N. A. 2, 1923.)

U. S. Survey Chart 248.

* * *

Aviation Light, Coco Solo, C. Z.

A *fixed red* light of 1,400 candlepower will be exhibited on the Coco Solo water tower on nights when airplane flights take place, which will be about twice a month.

This light will be elevated 185 ft. above mean sea level and will be visible 10 miles over the whole horizon and also in a vertical direction.

On nights when this light is in operation broadcasts will be sent out by radio from the canal zone.

Approx. position: 9° 22′ 27″ N., 79° 53′ 09″ W.

(N. A. 2, 1923.)

U. S. Coast Survey Chart 950.

* * *

Sand Point Aviation Field

Sand Point aviation field, Seattle, Wash. has a total area of 269 acres of which 40 acres is cleared and in condition for flying. This cleared area comprises a strip 500 ft. wide and about one-half mile long north and south. There are no obstructions, the water being directly in front of the north approach and southeastward of the south approach. Owing to the prevailing wind there is no cross wind.

The Army Air Service has arrangements with the Navy to use Sand Point Field for peace-time flying activities and has sent an overseas steel hangar to the field, which is now in process of erection. This hangar will be placed in the water so that it will be available for both sea planes and land planes; it should be ready for use not later than May 1, 1923.

Maj. H. C. K. Muhlenberg, AS, who is in charge of the R. O. T. C. Air Service, University of Washington, lives in the field quarters.

Approx. position: 47° 41′ N., 122° 15′ W.

(See Notice to Aviators 1 (1, page 23), 5 (36, page 107) of 1922.)

(N. A. 2, 1923.)

U. S. Coast Survey Chart 6449.

Important Notice to Air Pilots

All airplane, balloon and airship pilots, who have secured a Fédération Aéronautique Internationale brevet (Aero Club certificate), are requested to send their brevet to the Contest Committe of the National Aeronautic Association of the U.S.A., 26 Jackson Place, Washington, D. C., with a request for yearly aerial license, which is issued without charge. The brevet will be returned together with the license.

It is necessary that all pilots entering aviation meets or other aerial events present the annual license in connection with their brevets, which will indicate that they are pilots in good standing, that they are constantly engaged in flying and, therefore, qualified to enter into aeronautic competitions.

The Contest for Air Power in the Pacific

United States, Japan and Soviet Russia Competing for Hegemony in the Pacific

By G. K. Spencer
(Late of U. S. Naval Communications)

The Air Services of three nations have been given programs by their governments which involve their gaining the air hegemony of the Pacific. Officially, perhaps, no government would or could make such a pronouncement, but the policies of the governments concerned involve powerful air armaments in the Pacific, and the trend of development within the three air forces is toward air control in the Pacific.

As this is written, the base force flagship of the Pacific Fleet, U.S.S. Procyon, with Rear Admiral Jehu Chase and Lt. Comdr. P. N. L. Bellinger, senior aide to the Admiral commanding Air Squadrons, Battle Fleet, is at sea inspecting all United States air units in the Pacific, and "all projected air sites." Actually, this inspection is nothing more or less than an intelligent survey of possible air extension into the far eastern field.

Recently, the Imperial Japanese Navy completed an air survey of the Pacific, which extended even to the American littoral. The Japanese naval air forces are extensively active, and it is known that this service is turning out trained pilots at a furious rate.

Leon Trotzky on Air Power

One of the perplexing elements in the Pacific is Soviet Russia. The recent announcement by the Commissariat for war that Siberia was to be strung across with air stations and landing fields caused sufficient stir, without the supplementary quotations that such stations are to be extended to the Maritime Province, where seaplane centers are to be established. Leon Trotzky, at his last military review, tossed his head upward and gazed long at the zooming Red Army planes in the clouds above. "In the air all start alike," he cried, " and we shall not be behind!"

The condition in which the Naval Aviation service of the United States enters this Pacific contest in construction and training will be of interest to every American. Despite the fact that much secrecy must be observed regarding "Naval Air," it is felt that some reassurance must needs be given the average American that his own Air Service, though in many ways handicapped, is proceeding admirably on its way to either control Pacific air or at least guarantee by its excellence and readiness a long Pacific peace in the air. And God forefend a war with the developing weapons, for such war would be war to the supreme degree.

Trans-Pacific Airways

So rapid has been the progress of Naval Aviation since the war that the Navy now possesses planes capable of flying from the mainland to Hawaii, and a "hop" across the Pacific is regarded as feasible. But little time separates us from the realization of a great United States air line operating planes on schedules between the mainland, Hawaii and the Philippines. Indeed, at this time, the writer has been commissioned to offer a pilot $50,000 for the first flight from the United States mainland to Hawaii, with an additional $5,000 toward a special plane in which to make the trip. Two tentative acceptances have been received by pilots willing to make the cruise, which shows how feasible pilots regard the act.

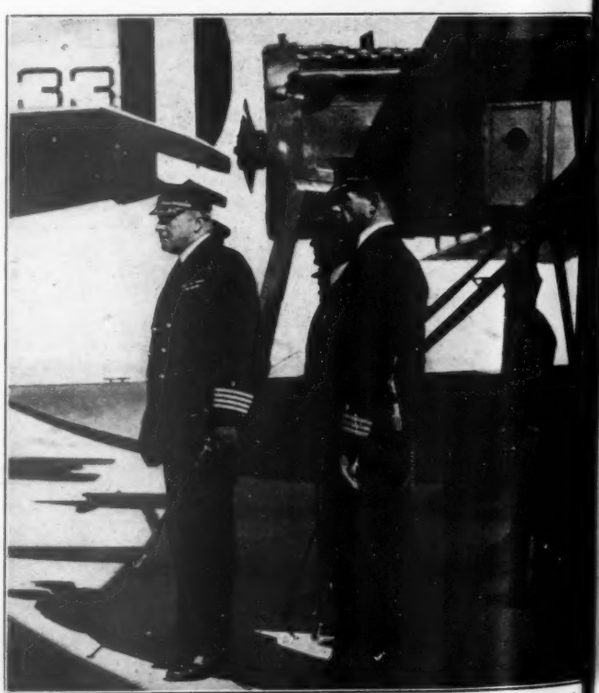
The Navy Department regards the question of Pacific air development as having arrived at a focus, and dozens of new models of ships, designed for every conceivable naval purpose, are under trial. The Navy passes nothing up. For instance, monoplanes have never attained considerable favor as military machines, but the Air Service has now under trial, and very favorable trial, the new Martin Monoplane for observation and combat.

The Douglas-Davis torpedo planes have been adopted as standard and are now being flown by squadrons by Naval pilots. Their use in Naval warfare will depend upon opportunity arising for annoying the enemy for strategical purposes. As a major element they promise little, but as a fast raiding element in conjunction with other arms of the service, they are regarded as valuable. Besides, the torpedo work from these planes has shown much precision. DeHavilands are at present the standard bombing and heavy-carrying units, with the fast Voughts employed for combat. These craft are all capable of long distance flights and are considerd as admirably fitted for operating from air bases or from aircraft carrier ships.

Situation in the Far East

The United States Naval Aviation units in the Far East are based on Hawaii, with stations in the Philippines. This organization can be expanded to all United States islands in the Pacific, including northern stations in the Aleutian Islands, which almost enclose the northern Pacific in a long arm hundreds of miles in scope.

It is not to be denied, Naval Officers believe, that so long as the Japanese have the mandate over the Caroline Islands, they will possess a strategical superiority in Asiatic air routes. The Carolines place a competitor directly in the air path between Hawaii, Guam and the Philippines. However, Japanese planes could not attempt a flight, under present aviation conditions, to the United States without hopping at least once to American islands, whereas the United States is organized in the Pacific, as this is written, for a trans-Pacific flight. In the event of war, one object of the Japanese would inevitably be to take and hold one of our possessions as an air base.



Official Photo U. S. Navy
Capt. W. R. Gherardi, U.S.N., Commander, Aircraft Squadrons, Scouting Fleet, making an inspection of torpedo planes at Hampton Roads, Va.

"If war were declared to-morrow, what would we do for aircraft?"

The Airport of San Diego

The principal American airport on the Pacific now is that at San Diego, where are based the Naval Air Station, which cares for all production and repair, and the Air Squadrons of the Battle Fleet.

Air conditions at San Diego are ideal, and this includes climate also. Four squadrons of planes are on the active list in the Battle Fleet, and other planes are in reserve. For reasons close to the public welfare, the exact figures on these planes and their personnel must be omitted.

At San Diego Capt. T. T. Craven, who headed all Naval Aviation during the war, is in command of the Air Station. Capt. A. W. Marshall commands the Battle Fleet Air Squadrons, with his squadron organization as follows:

VT-2....Torpedo and Bombing....Lieut. Comdr. R. A. Burg
VF-1....Combat Squadron....Lieut. Comdr. P. M. Bates
VO-1....Observation DH....Lieut. Comdr. M. B. McComb
VO-2....Observation DH....Lieut. Comdr. R. R. Paunack

These squadrons are the spearhead of the Pacific Naval Aviation. Detachments from these squadrons are made to the battleships for manning of observation and combat planes attached to the ships.

In case of necessity the Atlantic Air Squadrons could fly to San Diego, where sufficient facilities are at hand to base them. This is comparatively simple as a military operation and need not be dilated upon.

With the Fleet

Every operation of the Fleet is carried on with the aid of the air squadrons. Of course, all gunnery is checked and spotted by the observation units, and much scouting also carried on. By means of observation and photographic planes, the commanders are able to check their own operations, for frequently the photographers return photos of operations improperly carried out. Every Naval air flight formation is now photographed, and pilots flying improperly in the formation are instructed on their error.

With the Fleet the planes also produce smoke screens. The latest naval development is a smoke bomb, which is dropped by the plane, and which ignites on contacting with the water, sending forth dense smoke clouds.

All operative planes now carry spark or telephone radio installations for communication from ship to ship and land to ship.

Enlisted Pilots

The training and development of Naval Aviation pilots to enable the Department to have sufficient pilots at its command is being entered into in an intensive manner. The Navy Department has already made the innovation of training enlisted men as pilots, and several dozen chief petty officers have now been graduated from the flight schools and have been granted the wings of a pilot, with the regulation pilot's license. They are not commissioned as officers, but carry the same credentials as pilots.

Enlisted pilots have proven themselves entirely fit and are maintaining a high standard of excellence.

Airplane Carriers

The United States possesses one second line airplane carrier ship. It is the Langley, displacing 12,700 tons. The Japanese also have one carrier ship of 9,500 tons.

The United States is not building any aircraft carriers at present, but may convert two ships intended as battle cruisers, but nullified under the Naval pact. On the other hand Japan is building the Hosho as an aircraft carrier, but it is not known definitely whether the Amagi and the Akagi, which were laid down as battle cruisers and are to be scrapped under the Washington treaty, will be converted into aircraft carriers.

Flight Surgeons

Owing to the peculiarities of flying on the human organism, the Navy Department has found it necessary to have specially trained surgeons to act on aviation cases. Accordingly there have been appointed "flight surgeons" to study and fly with the pilots. Thus they observe under just what conditions aviation accidents occur, and they also examine the debris after all crashes.

These flight surgeons have authority to forbid a flight previously ordered by a commanding officer, if they believe the pilot not in the proper physical condition, and twice each year they will examine all officer personnel, and Chief Petty Officer pilots, to determine general flying fitness.

How an Aviation Order Looks

The following is a typical Naval Aviation order:

"Aircraft Squadrons, Battle Fleet"
"Operation Order"
"Tuesday, 20 February, 1923

(a) Observation Plane Squadron 2.

Position	Plane	Pilot
1	2-15	Lieut. Comdr. Paunack
2	2-10	Lieut. Comdr. Montgomery
3	2-18	Ens. Hasselman
4	2-7	Lieut. (j.g.) Finch
5	2-6	Lieut.. Schaeffer
6	2-9	Lieut. Campman
7	2-11	Lieut. (j.g.) Studley
8	2-8	

1. An exercise in rendezvousing and passing in review will take place on 20 February, nineteen twenty three, at ten hundred.

2. This Squadron will rendezvous over Dutch Flats at an altitude of three thousand feet on twenty February at ten hundred with VO-1 and VF-1 and then pass in review over the ship platform.

3. After passing in review return to squadron.

R. R. PAUNACK
Lieut. Comdr. U. S. Navy
Commanding
Observation Plane Squadron Two.

Aviation in Siam

The rapidity with which the art of flying is spreading in countries which are popularly believed to be backward, merely because their customs differ from ours, is well exemplified by the case of Siam.

That far off country, which was incidentally one of the Allies in the late war, recently organized an air force which now numbers 120 machines and some 300 pilots. Most of the latter were trained by French instructors, either in France or in Siam, and most of the flying equipment is of French origin. Recently a formation of four Bréguets, carrying five officers and three non-commissioned officers of the Siamese army flew from Bangkok, the capital of Siam, to Hanoi, the capital of French Indo-China, to repay the visit French army aviators had paid them the previous year. This trip represents a distance of about 600 miles of mountainous and largely inaccessible territory, and therefore speaks well for the proficiency of the Siamese air force.

A two-weekly air mail service is also in operation in Siam, operating regularly between Khorat and Ubon. During the month of July of last year this service carried 95 kilos of letters and 439 kilos of newspapers.

Six-Mile Gliding Record

A new distance record for gliding was established Feb. 26 by Alexis Maneyrol, holder of the world's gliding duration record of 8 hr. 4 min., when he glided from Vauville to Jobourg, a distance of 7.8 kilometers (4.8 miles). The performance was made in a wind of 17 meters per second. The duration of the flight was about 20 min.

Maneyrol took off from a hill 150 meters high and he rose to a height of only 65 meters above the hill crest before starting on his long glide. He used, as on his previous gliding flights, a Peyret tandem monoplane of the Langley type. This latest performance gives credence to Maneyrol's prophecy that he will glide from Vauville, near Cherbourg, to the Isle of Jersey before the summer is over.

"If war were declared to-morrow, what would we do for aircraft?"

A Radio Address by Admiral Moffett

Naval Air Chief Talks on Air Power

Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, in an address broadcast on March 6, 1923, from WJZ radio station, dealt in an interesting manner with the problem of air power and its relation to the foreign-owned possessions in the West Indies. He stated among others that the entire eastern seaboard of the United States was within easy aerial bombing range of the foreign insular possessions, and that Bermuda, in particular, occupied the same relation to the United States that Heligoland did to Germany during the War 1914-18.

Bermuda and Heligoland

Admiral Moffett told of the progress that had been made in developing naval aircraft; of the many inventions, notably the catapult, that had enabled aircraft to become an important adjunct to the navy in our defenses.

"Aviation has radically changed the relation of foreign-owned possessions in the West Indies and on the continental mainland to the United States," he said. "Bermuda occupies the same relation to the United States that Heligoland did to Germany during the last war. Bermuda is the center of an arc which, with a radius of 600 miles, would skim the Florida Coast and the South Atlantic States, pass inside of Cape Hatteras and close to New York and Long Island. Even in the present stage of development of aviation the entire Atlantic Coast, including the cities of Savannah, Charleston, Norfolk, New York and Long Island, are now within easy bombing distance of planes based on Bermuda.

"On the other hand, Bermuda is not within the radius of action of fighting planes. Fighting planes are the recognized and only really effective defense against bombing planes. The greatest radius of action of a fighting plane would fall far short of reaching Bermuda, whereas a bombing plane could attack any point on our coast and, as the point of attack would not be known, stretching from Florida to Boston, it would be necessary to have an enormous number of fighting planes scattered along the coast to meet all possible points of attack. In other words, aviation has brought Bermuda to our very doors, instead of being several days away by steamer.

Says Britain Would Rule Seas

"The nation holding Bermuda and having control of the sea would have a tremendous superiority in the air, which would enable it to bomb our Atlantic Coast. In war no nation could afford to neglect the advantage given by its possession of such a position to produce decisive results against this country.

"This situation applies not only in the case of Bermuda, but to the Bahamas and other foreign island and mainland possessions as well, owing to the fact that Great Britain's navy would undoubtedly have control of the sea with the present relative sea power of the two countries. Bermuda has been taken as an example, but similar conditions apply to the other West Indian Islands, including those owned by the French and Dutch. Jamaica, for instance, is within easy bombing distance of the Panama Canal; other British possessions on the mainland also possess this advantage.

"In the arms conference there was a full realization of the vital necessity of the United States retaining the right to make Pearl Harbor an impregnable base. When this is done it will render our Pacific coast practically immune to successful attack by a hostile fleet. From a strategic standpoint, its advantages are in no wise superior to Bermuda. In fact the latter's proximity to the Atlantic Coast makes it an even more important base from the standpoint of the national defense, as it is within easy striking distance for aerial attack, whereas Hawaii is beyond the range of aircraft operations against the Pacific Coast or the Panama Canal."

The Rigid Naval Airship

Admiral Moffett also spoke of the two rigid airships of the Navy, now under construction in this country and in Germany, respectively.

"The development of rigid airships," he said, "is left by joint agreement between the army and the navy in the hands of the Navy's Bureau of Aeronautics. In accordance with this agreement the navy is rapidly completing the huge rigid airship, the ZR1, at the Naval Air Station at Lakehurst, N. J., the work being done in the largest airship hangar in the world. At the same time there is being rushed to completion in Germany another big rigid airship, the ZR3. These two airships embrace the most improved factors in design known to aeronautical science, and when in commission will be the forerunners of a large fleet of such airships, which it is hoped can be built and commissioned in the near future. For long distance, sustained flights, in carrying large loads, the rigid airship is in a class by itself. Its capacity to hover over a given spot making for great accuracy in the dropping of bombs and in directing gun fire, establish it as an effective weapon for warfare far removed from the coast and from available bases.

"Filled with helium, a non-inflammable gas found only in large quantities in the United States, we have a tremendous factor in naval warfare and an agency of vital importance to the national defense.

"The ZR1, this country's and the navy's first rigid dirigible, will go into commission about July 1. She will be sent on trips over the principal cities of the country, trips across country, a trip around the world and to the North and South poles."

Aeronautical Patents

Granted Feb. 20, 1923

1,445,878 Balloon. Herman W. Faber, St. Louis, Mo.

1,445,894 Aircraft Covering and Method of Making Same. Oscar J. Laisy, Cleveland, Ohio.

1,446,000 Armament For Aircraft. Cleland Davis, The U. S. Navy.

1,446,011 Propeller. Robert Cattley Jackson, Calgary, Alberta, Canada.

1,446,280 Stabilized Bomb Sight. Morris M. Titterington, Brooklyn, N. Y., assignor to The Sperry Gyroscope Co., Brooklyn, N. Y.

1,446,334 Combination Airship and Airplane. William Franklin Carter, Prescott, Kans.

1,446,385 Aircraft-Landing Station. Earl C. Hanson, Washington, D. C.

Fine Altitude Flight

On Feb. 11, M. Casale, flying a Spad-Herbemont S56 biplane fitted with a 400 hp. Bristol "Jupiter" radial air-cooled engine, reached a height of 7200 meters with a useful load of 250 kg. The climb to 7200 m. took 50 min. and the descent 11 min.

This performance has not yet been homologated as a world's record, and it is possible that when the barograph readings are corrected for temperature and instrumental errors, M. Casale's performance will not exceed the present record of 6783 m., held by M. Le Boucher on a Breguet biplane fitted with a 250 hp. Renault engine equipped with a Rateau supercharger.

The Spad S56 is similar to the S33 and S46 cabin biplanes used on the Paris-Warsaw and Paris-Constantinople airways which are fitted with Salmson and Lorraine engines.

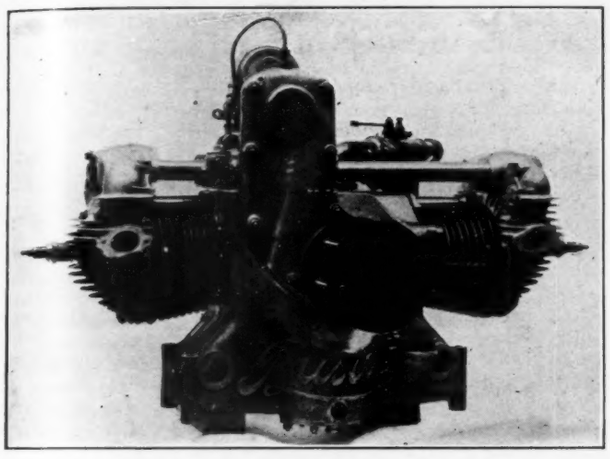
"If war were declared to-morrow, what would we do for aircraft?"

Bristol "Cherub" Engine for Small Aircraft

2 Cyl. Horizontal Opposed Type Develops 18 hp. for 85 lb. Weight

In view of the growing interest in gliders equipped with an engine of comparatively low horsepower, the Bristol Aeroplane Co., Ltd., has, for the past fifteen months, been developing and perfecting a small horizontal opposed 2 cylinder air-cooled engine suitable for this purpose. The experience the firm gained with its successful 400 hp. "Jupiter" and 100 hp. "Lucifer" air-cooled engines has assisted in the production of a smaller type, which is designated the Bristol "Cherub."

Twelve or fourteen years ago aircraft pilots were seriously handicapped by the limitations and failures of the small powered engines then in use. Engines of converted motor cycle type—as most of them were—they were probably quite satisfactory on the road when they were rarely run for more than a minute at full throttle, but for aircraft they were unreliable, and therefore useless. In the development of its new type, the Bristol Company has insisted upon sound reliability and has produced an extremely robust power unit. The new engine has been subjected to exhaustive experiments on the Froude test bench under conditions exactly similar to those demanded by the Air Ministry for large aero engines, and continuous ten hour non-stop power tests have been carried out on the Froude dynamometer.



Front view of the Bristol "Cherub" 2 cyl. horizontal opposed air-cooled engine

Two types of engines have been designed—one with driving boss running at crankshaft speed, to be used in conjunction with a chain-driven propeller, and the other with a 2 to 1 gear reduction enclosed in the crankcase.

In this engine all the valve mechanism is entirely enclosed, ball and roller bearings are used throughout, and the lubrication is entirely automatic. This engine can be left to run for long periods at full rated power, without any attention or adjustment—special measures having been taken to deal with the attendant troubles usual with overhead valve air-cooled engines.

The following are the main details of the engine:—

2 cylinders horizontally opposed.
Bore, 85 mm.
Stroke, 94 mm.
Rated horsepower, 18 at 2,500 r.p.m.
Weight of engine complete, 85 lb.
Gasoline consumption per hour, 12 pt.
Oil consumption per hour, ½ pt.

From the accompanying illustration of the engine its clean appearance will be noted, and also the fact that there are no exposed moving parts to lubricate, wear, or require adjustment.

The cylinder construction calls for attention as the head is detachable, and of aluminium alloy, the spark plug bosses being bushed in bronze.

The valve mechanism is of special interest. A single camshaft with four integral cams, and driven by very robust gearing from the crankshaft, lies inside the crankcase. The cams operate fingers, which in turn operate rocking shafts enclosed in tubes; the rocking shafts are returned by coiled springs, and the mechanism is such that when the cylinders warm up there is no increased clearance between the rocking shafts and valves. Twin concentric springs are used for the Tungsten valves. The whole mechanism is enclosed and automatically lubricated, thus remaining quiet, wear does not take place, and frequent adjustment is not necessary.

The crankshaft is very stiff and robust, and is supported on three ball bearings with thrust bearing.

The connecting rods are threaded on to the crankshaft, and run on case-hardened crankpins with 7/16 in. rollers. The big end of the connecting rod has a case-hardened bush inserted. The whole crankshaft and connecting rod assembly is of very ample proportions, and special attention has been given to the connecting rod roller bearing assembly, so that very long life can be guaranteed under continuous working conditions.

The crankcase is a one-piece casting, arranged at the rear end with a large aperture, which provides for the connecting rod assembly being inserted complete.

Lubrication of the engine throughout is automatic. Oil is positively delivered to the timing gears, camshaft, rocker mechanism etc. and pressure feed is directed on to the connecting rod assembly, from which the cylinders are lubricated by splash. The necessary lubricant, approximately 1 gal., is carried in the sump provided in the lower part of the crankcase, which floods the plunger pump. A convenient oil-filler and filter are provided.

Ignition is by B.T.H. twin-cylinder magneto, driven by gearing from the crankshaft.

Mixture is provided by a Zenith carburetor, drawing hot air from the exhaust pipe.

A small porduction batch of these engines is now being put through the shops, and those interested in this type of engine should send further enquiries to the Bristol Aeroplane Company, Ltd., Filton, Bristol, England.

Flying Tournament for Philadelphia

Plans for an international flying tournament to be held by the Aero Club of Philadelphia during the proposed Sesqui-Centennial Exhibition at Philadelphia in 1926 were considered at a recent meeting of the club at the Engineers Club. It was also announced that a semi-weekly dispatch edited by the club would be broadcast from one of the local stations within a few days. An illustrated talk was given by W. N. Jennings on aerial photography. President W. Wallace Kellett appointed the following committee on the proposed tournament: Hollinshead N. Taylor, B. C. Dallin, C. T. Leudington and Roy G. Miller.

Round the World by Air

Another round the world flight is announced. Capt. Pedro Zanni, of the Argentine Air Force, who will be backed in his enterprise by the Argentine Aero Club, plans to fly from Buenos Aires by way of Brazil and Africa to Rome, Italy, whence he intends to start on the round the world tour. His itinerary would lead him from Rome to the Near East, India, China, Japan, North America, Ireland and back to Rome. Captain Zanni intends to use a Fiat ARF biplane fitted with the 700 hp. Fiat engine.

"If war were declared to-morrow, what would we do for aircraft?"

Recent Activities of the A.E.S., M.I.T.

The Aeronautical Engineering Society at the Massachusetts Institute of Technology has held several meetings during the present school year. An account of the first, held Nov. 15, 1922, has already appeared in AVIATION. The speakers for this meeting were Otto C. Koppen and Harry C. Karcher of the Society's glider team, and Prof. E. P. Warner. Motion pictures of last summer's gliding competitions in France and Germany were shown.

On Dec. 6 an informal conference on motors was held in the R.O.T.C. Air Service room at M.I.T., where over a dozen airplane engines of the leading types were on exhibition. The speaker for the evening was Warren Noble, chief engineer of the Kinney Manufacturing Co. of Jamaica Plain, Mass., which is developing new types of aeronautical engines for the U. S. navy. Mr. Noble discussed in considerable detail many of the problems met in developing new motors, pointing out how particular difficulties had been discovered and overcome. Following Mr. Noble's talk those present had an opportunity to ask questions and to join in an informal discussion of aviation engines.

The first meeting this year was held on Jan. 11. The speaker was Prof. L. S. Marks of Harvard University, author of "Airplane Engines." Prof. Marks spoke on the subject "Supplying Fuel to Aeronautical Motors" with special emphasis on carburetor and manifold design. This was followed by an informal discussion of the subject among members of the Society and Prof. Marks.

A meeting open to all M.I.T. students and the public was held Jan. 25. The first speaker was President S. W. Stratton of the Massachusetts Institute of Technology, who, until recently assuming the presidency of the Institute, was a member of the N.A.C.A. and Chief of the Bureau of Standards, which bureau was first organized by him and owes its present position of importance very largely to his efforts in developing it. President Stratton spoke on his work in the N.A.C.A. and the Bureau of Standards in connection with aeronautics.

President Stratton introduced Maj. Gen. Mason M. Patrick, Chief of Army Air Service, who was the speaker for the evening. General Patrick opened his address by giving a short history of aviation, and went on to tell of the accomplishments of the Air Service during and since the war, and the developments which are being carried on at present. He pointed out the important part played by airplanes in war, stating that the result of any future war would depend very largely upon the effectiveness of the Air Service, upon which both land and naval activities are dependent. He described the Air Service's "flying tanks" which are armored against machine gun fire and capable of carrying large caliber non-recoil cannon. Mention was made of the new airships which will be able to fly to the North Pole and back, and can be used to transport troops and supplies and even small fighting planes which can drop from the mother ship to engage in combat, and then return to her, being picked up by hooks suspended from her keel. Moving pictures of bombing tests, taken from the bombing planes themselves, were thrown on the screen, showing operations against battleships.

The second part of General Patrick's talk was on helicopters. Moving pictures were shown of several types in flight, which showed them to be decidedly unstable. The official Air Service films of the new de Bothezat helicopter which recently made a record flight at McCook Field, were thrown on the screen. These pictures, which had been shown only once previously, showed the remarkable stability of the machine, which flew with apparent ease.

The next speaker was Prof. E. P. Warner who spoke on the "Operation of Commercial Air Lines." His talk was a detailed summary of his observations while traveling through Europe last summer and making a study of European airways, on which he flew some 2000 miles. His talk was illustrated with moving pictures and lantern slides showing the equipment of foreign airplanes and airports. Professor Warner explained the steps which will have to be taken before passenger lines can be operated successfully on a large scale in this country and pointed out the promising future which lies before commercial aviation once these steps are taken.

Several reels of motion pictures of the glider contests in Europe were thrown on the screen, showing the M.I.T. gliders, which were built by the Aeronautical Engineering Society, in flight. Some of the films had just arrived from Europe and were shown for the first time in this country. These pictures concluded the program for the evening.

The A.E.S. is conducting a glider design competition open to all students at M.I.T. This competition is similar to the one held last year by the Society, and it is expected that the winning design will actually be built, although it has not been determined whether or not the Society itself will undertake the construction.

With the consent of Professor Warner, the Society has had printed several complete sets of photographs which were taken by him at last summer's gliding meets in France and Germany, and has offered these photos for sale. Several hundred have been sold so far. These photographs show all the prominent gliders taking part in the contests, most of them in flight. The set of photos forms a very complete pictorial record of the gliding meets.

French Aircraft Win Spanish Competition

An international competition for military airplanes of the bombing, pursuit and observation types was recently held by the Spanish air authorities near Madrid. The competition answered the purpose of determining the type of aircraft having the best all round performance in each category, with a view to its adoption as standard equipment by the Spanish army air service.

The competition attracted considerable attention among European aircraft manufacturers, for it is common knowledge abroad that Spain is making a determined bid to build up a first class air power, which even though it be numerically inferior to that of the great powers, would have to be reckoned with in case of war. British aircraft industry was represented at the Madrid competition by Bristol and De Haviland; the French by Breguet, Farman and Nieuport; the Italians by Ansaldo; the Dutch by Fokker; and the Germans by Dornier and Albatros.

The conditions of the competition have not as yet been made public, but it is known that the three French participants finished first in all three categories. The competition for observation airplanes was won by a Breguet 19A2 (375 hp. Lorraine-Dietrich engine), piloted by Thiery, which developed a speed range of 50-144 m.p.h. carrying its military load of 4½ hr. fuel and two machine guns. The machine was also put through all kinds of acrobatics to demonstrate its maneuverability.

In the bombardment category a Farman Goliath (two 375 hp. Lorraine-Dietrich engines) piloted by Copet was declared winner, while the pursuit airplane competition was won by a Nieuport 29C (300 hp. Hispano-Suiza engine).

Several contestants were eliminated by accidents, some of which were of a serious nature. The Dornier pursuit plane had one wing fold up in the air, while the Ansaldo crashed on landing, killing its pilot. The Fokker pursuit plane also crashed, owing to control trouble which was said to be due to a breaking of an aileron.

Aircraft Supply Firm Changes Name

The Pennsylvania Hardware & Paint Co., of New York, which for the past two or three years has specialized in supplying aircraft materials to manufacturers being practically the only firm to carry in stock large quantities of material complying with government specifications, has changed its name to Aero Supply Manufacturing Co., effective March 13.

Steel strips, bolts, pins, etc., and innumerable other items which the aircraft manufacturers have had great difficulty in procuring have been promptly furnished by this company. Special machinery is now being added to the company's facilities and additions are being made to the present large stock which will make the Aero Supply Manufacturing Co.'s cooperation with the manufacturers still more valuable.

Wright Corp. to Build Aircraft

The following announcement has been issued by F. B. Rentschler, president of the Wright Aeronautical Corp.:

"After careful consideration, our company is now providing facilities for carrying on the experimental development of plane types. It is believed that active development of complete units for aircraft will ultimately make for the best product.

"Sometime in March we expect to have ready for occupation a new plant, constructed alongside our present one, which will house our plane activities. This plant will be just as modern in every detail as our present one, and will be sufficient to carry out our present program.

"It is expected that by spring we shall have concluded negotiations for flying facilities at some place adjacent and convenient to Paterson.

"Because of the intense concentration necessary during the war, it seemed advisable for our company to devote its entire activities to the development and manufacture of aeronautical engines. It was, therefore, quite natural that at the end of the war period we should continue to engage principally in the manufacture and development of engines. It is, of course, entirely consistent that the organization bearing the name of Wright should eventually resume the development and manufacture of complete airplanes."

Planes Make Contact in Flight

A daring and instructive demonstration of the possibility of having two airplanes make contact in flight took place March 8 at Mineola, L. I. Lawrence B. Sperry, flying a U. S. Army "Messenger" and Lieut. Clyde V. Finter, A.S., flying a DH4B, brought the two ships into contact eight times at different altitudes while flying at a speed of 65 m.p.h.

Sperry, whose machine was equipped with a wooden upright fastened to the upper wing, flew close enough to the De Haviland to touch with the upright the end of a twelve-foot metal ladder suspended from the larger plane. Both aviators were equipped with parachutes, but they were not needed in spite of the boisterous air.

The practical value of these tests is that they demonstrate the possibility of delivering messages and perhaps of refue'ling from one airplane to another while in flight.

New Attempt at Duration Record

Reckoning on flying two nights and part of three days in an attempt to stay in the air 44 hr., Lieut. John A. Macready and Lieut. Oakley C. Kelly, of the Army Air Service, are preparing to hop off from Wilbur Wright Field, Fairfield, Ohio, at the earliest opportunity offered by the weather.

This endurance flight for a new world's record will be officially checked for the National Aeronautic Association by Orville Wright as official representative and observer, Kenneth B. Lane as official timer, and Mayor Frank B. Lane, Bernard A. Whalen and Lorin Wright, all of Dayton, assistant observers.

Lieutenants Macready and Kelly hold the unofficial endurance record of 35 hr. 18 min. made last year at San Diego, Calif., also the record for the non-stop flight from the Pacific coast to Indianapolis. In the new test they will use the same Army Fokker T2 monoplane flown in these two performances. **The pilots will use no special clothing,** as they expect to keep warm by the heat furnished from motor exhaust through special tubing in the cockpit. They will carry only black coffee, beef broth, sandwiches and drinking water as food supplies, and have arranged their rest relays with a view to conserving their strength and nervous energy.

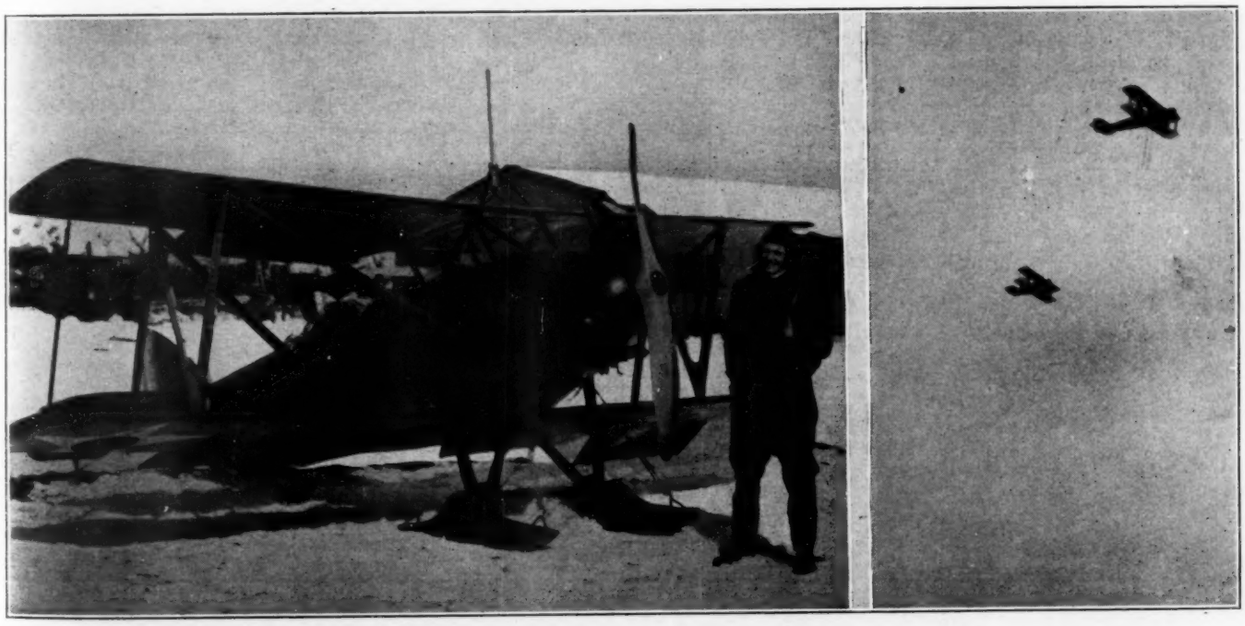
Minor changes that were made in engine installation for the convenience of the pilots include a heating arrangement, additional radiator shutters and protective housing against the cold in the pilot's compartment. A new method of injecting reserve water to the radiator was also devised so as to allow non-leak compounds to be used.

The high compression Liberty engine of twelve cylinders has been completely rebuilt, and during a five-hour test run showed that the minimum fuel consumption assures a continuous 44 hr. performance. Special gasoline for the flight will avoid the danger of freezing in high altitudes.

The airplane has night landing equipment and facilities for signaling to the official observers. Macready and Kelly are confident that the ship will come through with the 44-hr. record if the conditions aloft are at all favorable.

British Air Estimates

The estimates for the upkeep of the British Royal Air Force for the fiscal year 1923-24, announced March 8, show a gross total of £18,605,000.



(c) Kadel & Herbert

Making contact between airplanes in flight. On the left, Lawrence Sperry in front of the U. S. "Messenger" fitted with skis for winter flying; on the right, the "Messenger" is seen approaching from below the DH4 piloted by Lt. Clyde V. Fenton, A.S., from which a 12 ft. ladder is suspended

"If war were declared to-morrow what would we do for aircraft?"

ARMY AND NAVY AIR NEWS

Air Service

General Mitchell Ends 5000-Mile Air Trip—Brig. Gen. William Mitchell, Assistant Chief of Air Service, landed at Bolling Field late on March 2 after completing a 5000-mile inspection of Air Service stations.

General Mitchell left Washington on Jan. 21 by airplane. Adverse weather conditions prevailed the first day and the first stop was made at Dayton, Ohio. At the Dayton station extensive tests were made with a turbo-compressor. He also flew a new type of training machine seating the pilot and student side by side, and supervised the testing of night flying equipment, including landings and signaling lights.

From Dayton, the party proceeded to Selfridge Field, Mich., where intensive training maneuvers were conducted by the 1st Pursuit Group, which has recently developed a new gasoline tank, which when carried in the bomb rack of the machine so increases its gas supply as to allow it to be operated twice as far as a similar machine without this device.

General Mitchell's ship, the Osprey, was used to save the life of a man on Beaver Island whose skull had been fractured in an accident. Ice prevented access to the Island by boat, and the only communication was by radio. Lieutenant Meredith piloted the Osprey across the Michigan Peninsula from Selfridge Field in a blinding snow storm and then struck off directly across Lake Michigan to Beaver Island. The doctor was successfully landed, gave first aid and saved the man's life.

General Mitchell then proceeded to the Balloon School at Scott Field, near St. Louis, where a huge airship hangar has been recently completed. He made a 30 minute flight in one of the Army airships and visited Lambert Field, in the suburbs, where the Pulitzer race will be held next year.

General Mitchell went from St. Louis to San Antonio, Tex., where he inspected the Air Service Primary Flying School at Brooks Field, the Advanced Flying School at Kelly Field, the Air Service Supply Depot at Kelly Field and the First Attack Group. The General conducted tactical maneuvers with the Attack Group, based on Kelly Field. DeHaviland planes, equipped with eight guns each and GAX airplanes carrying nine guns each were employed in the problem.

Next the Air Service units at El Paso, Tex., were inspected, and then after a flight along the Southern border, the party turned north and within three days were flying along the Canadian Border.

Upon the invitation of the Canadian Government, General Mitchell made a visit of courtesy to the Governor General of Canada at Ottawa. The General flew from Detroit, landing at Camp Borden, Canada. He was accompanied on his trip by Wing Commander Christie, Air Attache, British Embassy. At Selfridge Field where the plane took off, there was less than an inch of snow on the ground, while at Camp Borden the snow was five feet deep in some places. The American de Haviland planes, equipped with wheels sank into the deep snow up to the wings, breaking the propeller. No material damage was done to the ships and they were used to continue the trip. At the University of Toronto, Toronto, Canada, General Mitchell visited the laboratory of Dr. McLennan who first reduced helium gas to a liquid.

From Toronto, General Mitchell proceeded to Ottawa, the headquarters of the Air Force, where he was extended the courtesy of much information on the Canadian forces.

* * *

Additional Gunnery and Bombing Facilities at Kelly Field—A rectangular tract of land, approximately two miles by two and one-half miles, west of Kelly Field, has been leased as a range for gunnery and bombing operations. A mosaic of this land has been made, and machine gun targets are being erected. A small barrier is to be constructed in a stream to provide a pond to float silhouette targets.

* * *

Progress of the Primary Flying School—Statistics compiled by the Operations Officer of the Air Service Primary Flying School at Brooks Field, show for the first month of instruction of the flying class of Jan. 2, 1923, that of the total number of students, 119, nine were disqualified; sixty students flew solo; the average number of aircraft hours flown daily was 100, and there were two minor crashes.

* * *

Night Flying in Airships Scheduled for Scott Field—Some thirty large flood lights have been installed on the sides of the hangars bordering on the west edge of the landing field at Scott Field. This was done in anticipation of the night flying in airships, which is scheduled to begin in a short time as part of the course of instruction in airship piloting.

Members of the Air Service Flying Expedition to Porto Rico: Upper row, L. to R.—Lieuts. Erik H. Nelson, Edgar T. Selzer, George C. McDonald, Ivan G. Moorman, Delmar H. Dunton, James A. Woodruff, Newton Longfellow; lower row—Lieuts. Guy Kirksey and Caleb V. Haynes, Capt. Thomas G. Lanphier (commanding officer), Lieuts. Charles B. Austin and Rex K. Stoner

"If war were declared to-morrow what would we do for aircraft?"

Army Orders—Maj. George W. De Armand, A.S., Fort Benjamin Harrison, Ind., transferred to Field Artillery.

Staff Sergt. Nye P. Justice, A.S., 25th Bomb Sqd., France Field, transferred as staff sergt. to 88th Obs. Sqd., Fairfield A.I.D., Ohio.

Staff Sergt. Russel C. Peckham, A.S., 88th Obs. Sqd., Fairfield, A.I.D., Ohio, transferred to 25th Bomb Sqd., France Field.

Warrt. Off. Warren C. Bailey, from Mitchel Field to Langin Field, Moundsville, W. Va.

Sec. Lieut. Frank W. Simpson, A.S., (C.A.C.) relieved from detail in A.S., Brooks Field; assigned to 60th Art. Batt. (Anti-Aircraft), Fort Crockett, Tex.

Maj. Benjamin Delahauf Foulois, A.S., promoted to grade of Lieutenant Colonel. To remain on present assignment.

Capt. Robert Oldys, A.S., from Hawaiian Dept. to United States, report to Adjutant General.

Order to Lieut. Raymond S. Jett, A.S., from Kelly Field to Post Field, revoked.

Sec. Lieut. Arnold H. Rich, A.S., from Kelly Field to Post Field..

Staff Sergt. Adolph Gerber, A.S., 26th Attack Sqd. placed on retired list, Kelly Field.

First Lieut. Thad V. Foster, A.S., San Francisco, from Hawaii, to Langley Field.

First Lieut. Clarence E. Shankle, A.S., previously directed from Kelly Field to Aberdeen Proving Ground, is redirected.

Capt. Idwal H. Edwards, A.S., previously assigned to Kelly Field upon completion of foreign service, is redirected to report to Adjutant General.

Maj. Harvey B. S. Burwell, A.S., from office, C.A.S. to Kelly Field.

* * *

Death of Lieut. Stanley Smith—Lieut. Stanley Smith, A.S., was killed and Maj. Follett Bradley, A.S., was seriously injured when the Martin Transport of the Air Service in which they were flying from Mitchel Field to Chanute Field turned over on landing owing to engine failure in a vacant field in East New York, March 5. Four enlisted mechanics who were being transferred to Chanute Field escaped all injury.

When at a height of 5000 ft. over Fort Hamilton, the connecting rod of the port engine broke, and the remaining engine was unable to sustain the heavily loaded ship in flight. Major Bradley, who was piloting, headed the ship for the nearest open space, but to avoid landing in a street he had to land in a field full of mud holes and refuse heaps. In landing the ship deleted its landing gear and bumped into a discarded boiler, when she turned over on her back. The two officers who were sitting in the front cockpit were knocked unconscious by the impact, and were later extricated by a policeman and rushed to a hospital. Lieutenant Smith died shortly after arriving there. Major Bradley is reported at last accounts to be doing favorably.

A board of inquiry was appointed by Maj. W. R. Weaver, commandant at Mitchel Field, to investigate the cause of the accident.

Major Weaver issued a statement commending Lieutenant Smith who was killed "in a gallant and successful effort to save the lives of others," and likewise praising Maj. Follette Bradley, who "gave first thought to the safety of people on the ground." The enlisted men, who "in spite of shock and minor injuries, immediately set about the work of rescue," were also praised, as was Patrolman Albert Douglas, who is credited with having probably saved the life of Major Bradley and facilitating the release of the enlisted men buried in the cockpit of the bomber.

* * *

Appointments—The Secretary of War has recommended to the President that he nominate for commissions as Second Lieutenants in the Air Service, Regular Army, the following:

Enlisted Men, Regular Army—John Francis McGowan.

From Civil Life or Third Class under Act of June 4, 1920—Gerald Crofoot Magnus, Robert Boyd Williams, Milton John Smith, Michael Vincent Healy, James Eldridge Gardner, Hilton Welborn Long, Leo Henry Dawson, Richard Andre Peterson, Walter Howard De Lange, Ralph Adel Snavely, Glen Trice Lampton.

Preparations for New Speed Trials—Instructions have been issued by the Chief of Air Service to the Engineering Division at Dayton, Ohio, to prepare two airplanes for a proposed attempt to establish new speed records over a one-kilometer course before the end of this month.

The two airplanes are the Curtiss pursuit machines in one of which Brig. Gen. William Mitchell on Oct. 18, 1922, established the one kilometer world's record at a speed of 222.97 m.p.h., recently broken in France by Sadi Lecointe at the speed of 233.01 m.p.h. The other Curtiss airplane is the machine piloted by Lieut. R. L. Maughan of the Army when he set up the world mark for 100 kilometers (62.13 miles) at Detroit, in 18 min. 6.78 sec.

It is reported that in the course of required tests during the spring and summer the Army fliers will attempt to break every world's record not already held by an American aviator, and that training for these tests is already under way. The forthcoming speed trials will be observed and timed by officials of the National Aeronautic Association, the timing being done by an electric device which is the most accurate method known. The selection of the Army pilots who will engage in the speed tests will be made about March 20.

* * *

Major Hickham's New Assignment—Maj. Horace M. Hickam, Air Service, who has been on duty in Washington, D. C., as Chief of the Information Division, Office, Chief of Air Service, for nearly four years, was recently transferred to Kelly Field, Tex., where he has assumed command of the Tenth School Group. He is also Assistant Commandant of the Air Service Advanced Flying School at that field.

It is doubtful if the transfer of an officer from one city to another has occasioned such universal regret as in the case of Major Hickam. Always cordial and genial in disposition, his host of friends in Washington will surely miss him.

Major Hickam has been succeeded as Chief of the Information Division by Maj. Ira A. Rader who, prior to his new assignment, served as Air Officer of the 7th Corps Area with headquarters at Fort Omaha, Neb.

* * *

Porto Rican Fliers Reach Havana—The Porto Rican Flying Expedition commanded by Capt. Thomas G. Lanphier, A.S., flew on March 6 from Montgomery, Ala., to Jacksonville, Fla., and on March 7 from Jacksonville, Fla., to Miami, Fla., where the six DH4B's landed at Curtiss Field.

On March 11 the formation flew from Miami to Havana, Cuba, landing at Camp Columbia. The fliers were enthusiastically feted in the Cuban capital.

Coming Aeronautical Events

AMERICAN

May — *National Balloon Race.*
Oct. 1-3 — *National Airplane Races, St. Louis, Mo.*
Late Fall — *Curtiss Marine Flying Trophy Race.*

FOREIGN

1923
March 23 — *Entries close for Gordon Bennett Balloon Race.*
May 13 — *Grand Prix (Balloons), Paris, France.*
June 25-30 — *International Aero Congress, London..*
July 20- — *International Aero Exhibition, Gothenburg,*
Aug. 12 *Sweden.*
Aug. 5-26 — *Sailplane Meet, Vauville, near Cherbourg, France.*
Sept. 28 — *Schneider Maritime Aviation Trophy Race, Cowes, Isle of Wight, England.*
Dec. 1 — *Entries close for French Engine competition.*

"If war were declared to-morrow, what would we do for aircraft?"

Death Notices—The Adjutant General's Office has issued the following death notices:

FRANK T. HONSINGER

Killed in airplane accident, Laredo, Tex., Feb. 9, 1923. Born in Michigan, Nov. 14, 1894. Appointed from New York. Pvte. M.E.R.C. June 27, 1917; Sec. Lieut. Av. Sec. Signal Corps, Apr. 22, 1918; hon'ly discharged, N.A., Nov. 1, 1920. First Lieut. A.S. Aug. 4, 1921. B.S., C.E., Ohio Northern University, 1917.

He was on duty at Park Field, Tenn., from Apr. 22 to May 6, 1918; at Camp Dick, Dallas, Tex., to May 23, 1918; at Langley Field, Va., to Oct. 1, 1918; at School of Mil. Aeronautics, Cambridge, Mass., as student to Feb. 26, 1919; at Langley Field, Hampton, Va., with 88th and 50th Aero Squadrons to Apr. 23, 20; on leave and changing station to May 10, 20; with 9th Aero Squadron at Fresno, Calif., to Nov. 1, 1920, date of discharge from emergency commission; on duty at Carlstrom Field, Fla., from Sept. 9, 1921, to June, 1922; at Post Field, Fort Sill, Okla., from June 13 to June 27, 1922; at Kelly Field, Tex., to date of death.

HARRY J. MARTIN

Killed in airplane accident, Kelly Field, Feb. 10, 1923. Born, New York, April 30, 1896. Appointed from New York. Pvte. Av. Sec. Signal Corps, March 2, 1918; Sec. Lieut. A.S., Sept. 21, 1918; hon'ly discharged Feb. 4, 1919. First Lieut. A.S., July 1, 1920.

He was on duty at Souther Field, Ga., from Sept. 23, 1918, to Oct., 1918; at Garden City, L. I., N. Y., to Oct. 26, 1918; enroute to and on duty in Europe, returning to the U. S., Dec. 4, 1918; at Air Service Depot, Garden City, L. I., N. Y., to date of discharge from emergency commission. On duty at Ft. Ontario, N. Y., from Sept. 19 to Oct. 10, 1920; at Langley Field, Va., (absent at Carlstrom Field, Fla., as student officer, March 26 to June 6, 1921) to June 20, 1922; at Kelly Field, Tex., to date of death.

Naval Aviation

Aircraft Carrier Langley Joins Fleet—The experimental airplane carrier, U.S.S. Langley, now operating off Pensacola, Fla., has been ordered to proceed to the Canal Zone in order to join in operations with the fleet. This will afford the congressional party that accompanied the Secretary of the Navy on the U.S.S. Henderson an opportunity to see an airplane carrier in action and will be the first appearance of the Langley with the fleet.

The U.S.S. Henderson carrying a party of senators, congressmen, newspaper men and officials of the Navy Department sailed from the Navy Yard, Washington, D. C., at midnight March 5 for Panama where the party will witness the combined fleet maneuvers and see the experimental firing at the U.S.S. Iowa.

* * *

Casualties—Lieut. R. M. Farrar, U.S.N., and Aviation Machinist's Mate Stephen F. Sullivan, U.S.N., were killed in a seaplane crash near Philadelphia on March 7, the Navy Department has been advised.

Lieutenant Farrar was piloting an experimental flying boat, with Sullivan as mechanic, from the Naval Aircraft Factory at Philadelphia, to Anacostia, D. C., when the accident occurred. The plane crashed in the river about seven miles below Philadelphia. No details of the accident are given, but the reports state that both bodies were recovered and were taken back to Philadelphia on a tug.

Lieutenant Farrar was attached to the Naval Bureau of Aeronautics.

Machinist's Mate Sullivan was enlisted in Chicago in 1921.

* * *

Naval Orders—Lieut. John N. Harriman, det. Nav. Air Sta. Pensacola, Fla.; to Rec. Barracks, Hampton Roads, Va.

Gun. LeRoy H. Ripley, det. U.S.S. Ortolan; to Aire. Sqds. Battle Fleet.

Pay Clk. Crawford T. Folsom, det. Rec. Ship San Francisco; to Nav. Air Sta. Pensacola, Fla.

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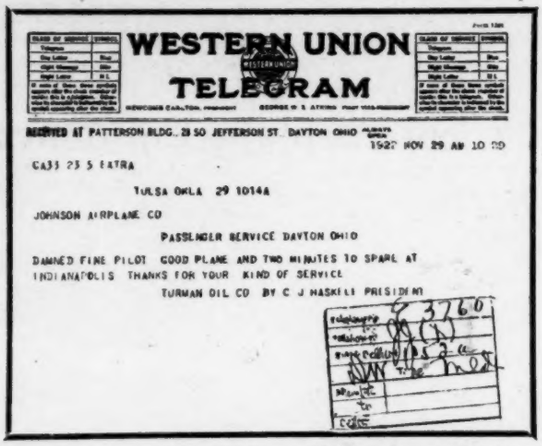

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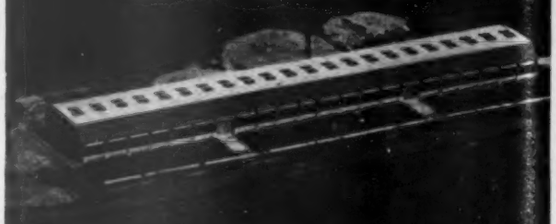

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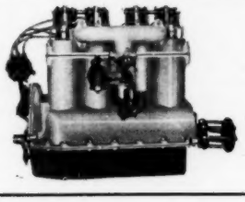

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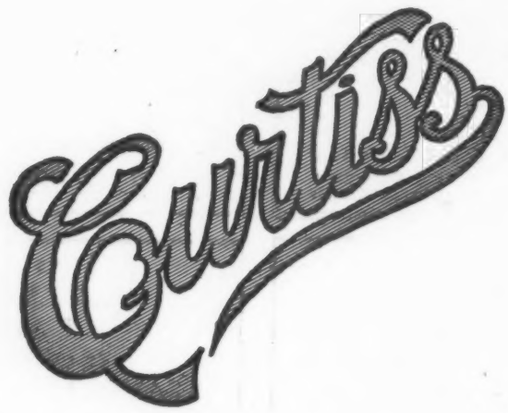

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